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Enterprise Backup Solution for VERITAS Backup Exec™

Abstract: The Compaq StorageWorks Enterprise Backup Solution (EBS) is an integration of backup and restore application software and industry-standard hardware providing a complete enterprise-class solution. Compaq has partnered with VERITAS to provide a solution that supports the backup and restore of homogeneous/heterogeneous operating systems using VERITAS Backup Exec™ software.

This document provides an overview of the Enterprise Backup Solution for VERITAS Backup Exec™.

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Enterprise Backup Solution for VERITAS Backup Exec™
White Paper prepared by Multi-Vendor Solutions Storage Products Division

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Introduction

Note: This paper includes the terms *fibre* and *fiber*. Fibre is the international spelling that refers to the Fibre Channel Standards that include optical and copper media. Fiber refers to the optical media used to implement Fibre Channel.

Backup Exec™ from VERITAS is a storage management software package that focuses on data backup and restore. The goal of backup and restore can be accomplished with many different tape devices and in various configurations and using a variety of different transport methods like the corporate communication network, a server's SCSI bus, or using a Fibre Channel infrastructure.

Compaq has partnered with VERITAS to provide an enterprise backup solution (EBS) using the speed and scalability of Fibre Channel technology. Compaq supports the backup and restore of homogeneous/heterogeneous operating systems using VERITAS Backup Exec™ software. The EBS with VERITAS Backup Exec™ uses a storage area network (SAN) that provides dedicated bandwidth independent of the local area network (LAN). This independence allows single or multiple backup or restore jobs to run without the network traffic that is caused by traditional data protection environments.

This white paper explains how data backup and restore is provided with Backup Exec™ using an automated digital linear tape (DLT) library and Fibre Channel technology. Backup Exec™ incorporates database protection and storage management agents and options for storage area network (SAN) environments. These agents and options are specifically designed for:

- Complex messaging
- Transaction intensive databases
- Storage system management and server recovery options that can be installed from any centralized backup server

This solution includes Compaq ProLiant servers sharing DLT libraries interconnected through a StorageWorks Fibre Channel Storage Hub 7 or StorageWorks Fibre Channel Storage Hub 12 and Fibre Channel tape controllers. The servers can be running either Microsoft Windows NT 4.0 or Novell NetWare in a homogeneous or heterogeneous environment.

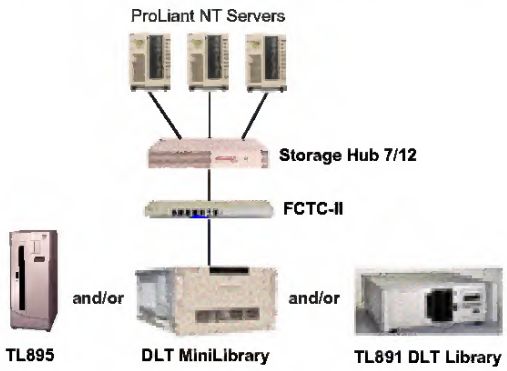

Figure 1: Example of Enterprise Backup Solution for VERITAS Backup Exec™

The Backup Exec™ application will manage backup operations across the enterprise from any location.

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Servers and Operating Systems

The following ProLiant servers used in this solution must be running Microsoft Windows NT 4.0 with SP 4 (or later) or Novell NetWare 4.11 (or later):

- ProLiant 800
- ProLiant 1500
- ProLiant 1600
- ProLiant 1850
- ProLiant 2500
- ProLiant 3000
- ProLiant 4500
- ProLiant 5000
- ProLiant 5500
- ProLiant 6000
- ProLiant 6400
- ProLiant 6500
- ProLiant 7000
- ProLiant 8000
- ProLiant 8500

Enterprise Backup Solution Components

The components described in this solution consist of the following libraries, ProLiant servers, Fibre Channel tape controllers, and Fibre Channel hubs:

- DLT 35/70 Mini-Library
- TL891 DLT MiniLibrary System
- TL895 DLT Library
- Compaq ProLiant server running Windows NT 4.0 with SP 4 (or later)
- Compaq ProLiant server running Novell NetWare 4.11 (or later)
- Fibre Channel Tape Controller
- Fibre Channel Tape Controller-II
- Compaq StorageWorks Fibre Channel Storage Hub 7
- Compaq StorageWorks Fibre Channel Storage Hub 12
- Compaq StorageWorks Fibre Channel Host Bus Adapter (one per server)

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Each server in the EBS needs to have a Fibre Channel Host Bus Adapter installed in a PCI slot. The Host Bus Adapter is a bus master device that takes advantage of the PCI architecture by performing high-speed data transfers.

The most important components of the EBS are the tape libraries. The DLT libraries automate the tape handling process which frees valuable administrative resources. The automated tape libraries provide dedicated service 24 hours a day, 7 days a week.

The EBS supports more than one library for scaling and performance needs.

Libraries

DLT 35/70 Mini-Library

Tape library automation is an important element of the Compaq StorageWorks Enterprise Backup Solution. The DLT 35/70 Mini-Library:

- Contains up to two DLT 35/70 tape drives
- Stores up to 1 TB of data on 15 tapes (using 2:1 compression)

TL891 MiniLibrary System

The TL891 MiniLibrary system is a scalable library that can start with two drives and:

- 10 cartridges and grow up to 10 drives and 66 cartridges for maximum performance
- 10 cartridges and grow up to 90 cartridges for maximum capacity

The TL891 MiniLibrary system consists of the TL891 MiniLibrary, the TL891 MiniLibrary Expansion Unit, and the MiniLibrary Data Unit.

The TL891 MiniLibrary:

- Is a multimodule, virtual library
- Comes in a single rack (4U height) or workbench configuration
- Supports up to two DLT 35/70 drives
- Provides up to 700 GB (using 2:1 compression) of storage

The MiniLibrary Expansion Unit:

- Controls all of the attached TL891 modules
- Creates a multi-module virtual library in a single rack mount configuration
- Provides 1.1 TB (using 2:1 compression) of storage
- Supports up to five additional modules in a single rack mount configuration

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A special pass-through mechanism makes all the tapes within this multi-module configuration available to all DLT drives facilitating the creation of a virtual library.

The MiniLibrary Data Unit:

- Is a 16 cartridge rack mount module
- Provides additional backup capacity of up to 1.1 TB (using 2:1 compression) in a TL891 multi-module configuration

TL895 DLT Library

The TL895 is a high-performance, free-standing DLT library that:

- Contains a 96-slot automated library unit
- Provides up to 6.7 TB of mass storage capacity (using 2:1 compression)
- Supports from two to seven DLT 35/70 drives
- Supports the ProLiant series servers

Adding the TL895 to the EBS product mix provides:

- **Increased performance**—The TL895 offers up to seven DLT 35/70 drives for transfer rates up to 180 GB/h (using 2:1 compression).
- **Increased scalability**—The TL895 is available in two- to seven-drive configurations to match performance and retention needs, allowing lights-out operations.

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Fibre Channel Tape Controllers

Fibre Channel Tape Controller

The Fibre Channel Tape Controller (FCTC) is a rack-mountable, 1U form factor Fibre Channel tape controller that translates the Fibre Channel protocol to a SCSI protocol between the Fibre Channel Network and the Differential SCSI devices. This translation of protocols allows the sharing of the tape libraries. The FCTC controller handles single-channel in/single-channel out SCSI.

For maximum throughput, Compaq recommends attaching up to two DLT drives per FCTC.

Fibre Channel Tape Controller-II

The FCTC-II provides the capability to attach SCSI DLT Libraries to the Fibre Channel SAN. Each FCTC-II has a single Fibre Channel connection and dual 20 MB/s SCSI buses, each of which can be connected to a maximum of two tape drives per bus for a total of four DLT 35/70 drives.

Gigabit Interface Converters (GBICs) are used for media interface. The FCTC-II supports either short-wave[1] (GBIC-SW) or long-wave (GBIC-LW) GBICs. Although GBIC-LWs support up to 10 Km (6.2 miles) between components, Compaq recommends that the sum of the lengths of all of the segments in the Fibre Channel arbitrated loop (FC-AL) for this solution should be limited to 2.8 Km (1.7 miles).

The FCTC-II is rack-mountable and has a 1U form factor.

Fibre Channel Storage Hubs

Compaq StorageWorks Fibre Channel Storage Hub 7

The Storage Hub 7 is a seven-port hub that creates a 100 MB/s FC-AL. The Storage Hub 7 connects up to 7 Fibre Channel components, which enables multiple servers and tape devices to be connected to an FC-AL for a centralized backup solution. A 1U rack-mounting kit is available for the Storage Hub 7.

If cascading is needed, the Storage Hub 7 can be replaced with the Compaq StorageWorks Fibre Channel Storage Hub 12.

Compaq StorageWorks Fibre Channel Storage Hub 12

A single Fibre Channel Storage Hub 12 is a 12-port hub that creates a 100 MB/s FC-AL. The Storage Hub 12 connects up to 12 Fibre Channel components, which enables multiple servers and tape devices to be connected to an FC-AL for a centralized backup solution.

For example, nine servers can be connected to the storage hub, leaving three available ports for connection to Fibre Channel Tape Controllers. Every Storage Hub 12 includes both a rack-mounting kit and rubber feet for desktop use. The rack-mountable Storage Hub 12 has a 1U form factor.

[1] The FCTC-II ships with 1 short-wave GBIC.

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The Storage Hub 12 offers an optional module that provides management for the Storage Hub 12. The features include:

- Topology Mapping of devices and nodes
- Hub status
- Port and Interconnect diagnostics
- Node status monitoring

Additionally, two Storage Hub 12s can be cascaded together to provide connections for up to 22 devices. Compaq currently supports a maximum of 20 servers on one loop. This allows up to eight DLT drives to be connected into a one-hop, cascaded solution. For additional server counts, more than one EBS solution may be implemented.

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Enterprise Backup Solution Architecture Configurations

Basic BackPaq Configuration

For consistent, consolidated, high-speed backup and restore operations in Windows NT and NetWare environments, Compaq has partnered with VERITAS to provide the EBS BackPaq. The EBS BackPaq is a product consisting of one Storage Hub 7, one FCTC, and a five server license. This product supports five servers and up to two DLT drives using any of the EBS supported DLT tape libraries.

Figure 2 shows a basic BackPaq configuration.

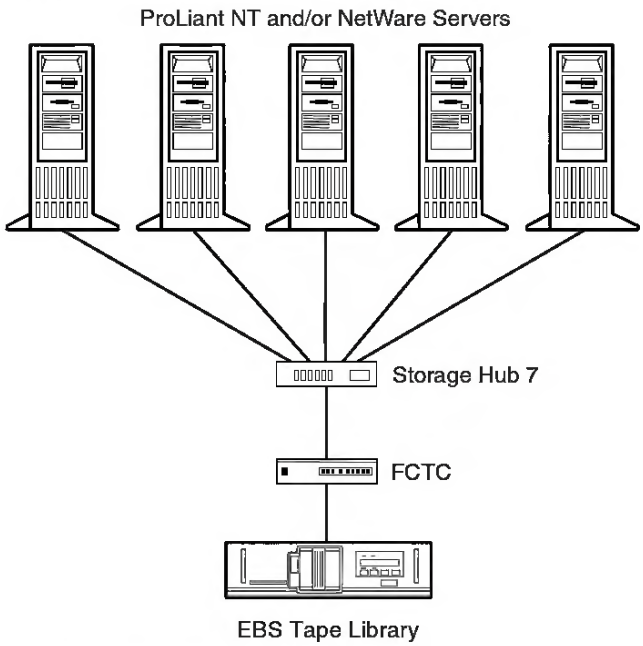

Figure 2: Basic BackPaq configuration

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Maximum Server Configuration

The current EBS for VERITAS Backup Exec™ supports a maximum of 20 servers in a cascaded 12 port hub environment as shown in Figure 3. If shorter backup windows are needed, additional DLT drives can be added. For every server that is eliminated, up to four drives can be added with the FCTC-II to increase the aggregate throughput of the EBS. See the "Sizer Utility" section to determine performance of the EBS.

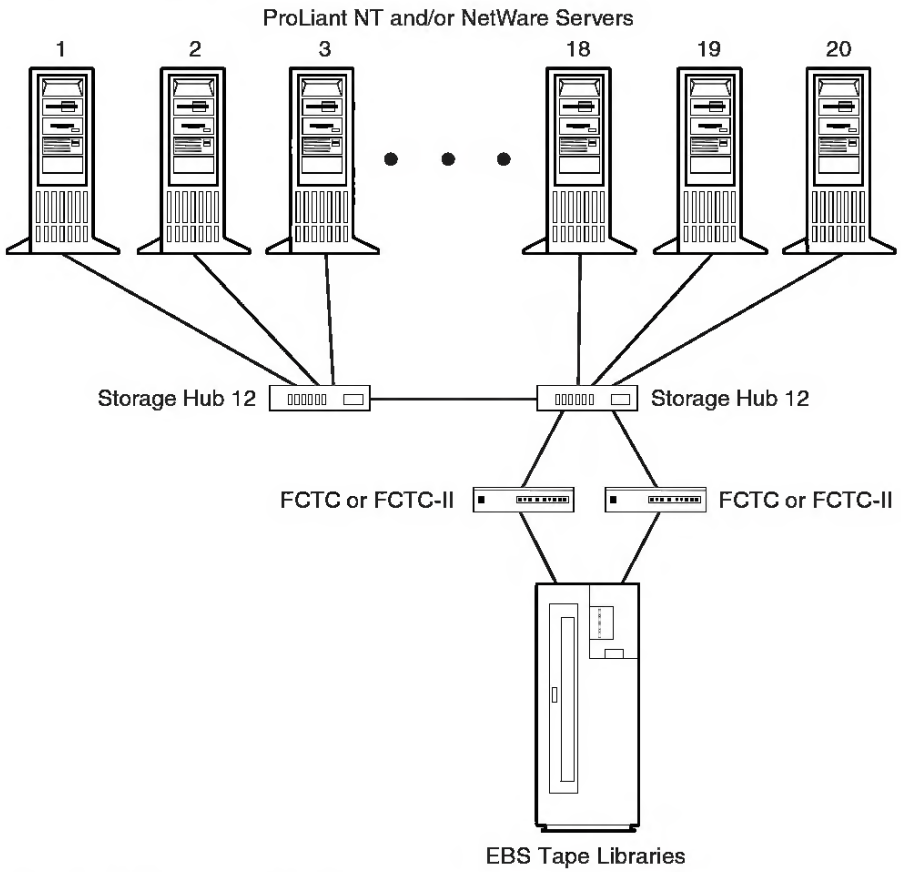

Figure 3: Maximum configuration

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Heterogeneous Windows NT and NetWare Configuration

EBS for VERITAS Backup Exec™ also supports a heterogeneous Windows NT and Novell NetWare environment. Multiple Windows NT and NetWare servers can share the same EBS SAN to backup to the same DLT library. For more information on setting up this environment, refer to the Compaq white paper on the Compaq EBS website at:
www.compaq.com

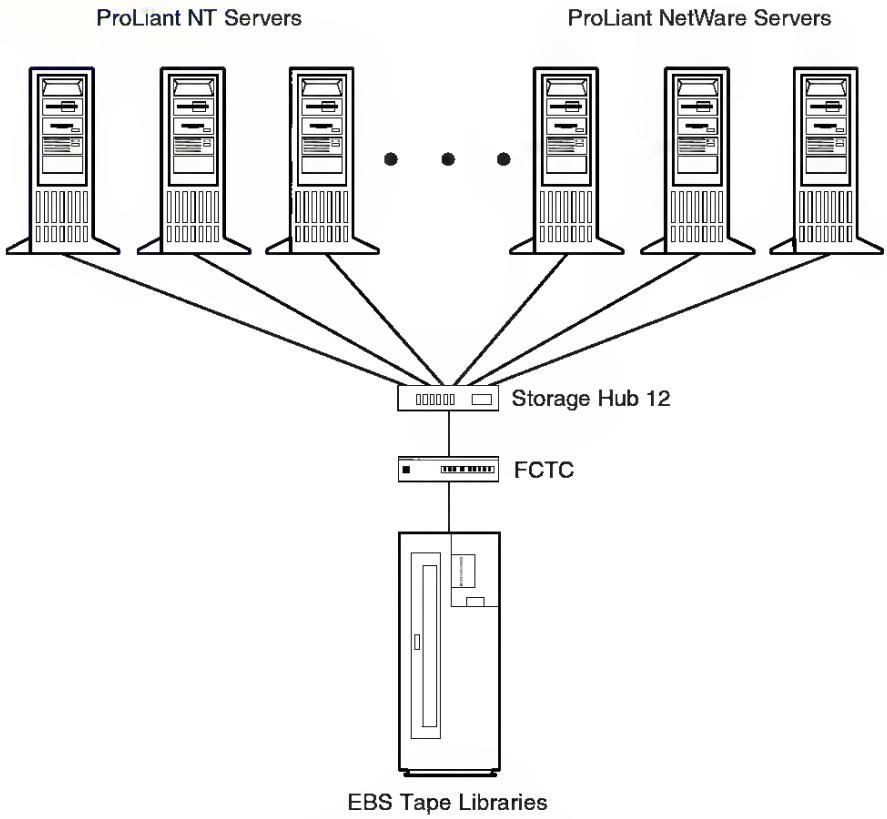

Figure 4: Heterogeneous Windows NT and NetWare configuration

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Enterprise Backup Solution Management Software

The software for this solution includes:

- VERITAS Backup Exec™
- Compaq StorageWorks Command Console
- Compaq User Diagnostics
- Compaq Insight Manager
- Compaq Insight Manager XE

VERITAS Backup Exec™

Features and Benefits

Deployed in an EBS environment, Backup Exec™ configured with the Shared Storage Option uses a dedicated FC-AL to perform backup and restore operations. Backup traffic is separated from the LAN eliminating network bandwidth bottlenecks that reduce productivity for the network users.

The Shared Storage Option allows all servers configured in the SAN to dynamically share a common set of tape devices. Advanced Device and Media Management (ADAMM) database for Backup Exec™ resides on one Backup Exec™ server and provides management capabilities for the shared devices. Backup Exec™ uses this shared database to arbitrate all device and media requests preventing accidental media overwrites. The ADAMM database also provides for central device and media tracking and reporting.

Additionally, due to the manner in which devices are mapped by the Fibre Channel tape controller, tape libraries are always presented to the application in a consistent order. This consistent presentation of tape libraries eliminates the need to reconfigure the application in case a tape drive or a library fails.

Options and Agents

Backup Exec Intelligent Disaster Recovery™ Option—This option provides the only point-in-time recovery solution for both local and remote Windows NT systems. This option eliminates the need to reload the entire operating system.

Using either the diskette-based, exclusive CD-R/CD-RW or the bootable tape (One Button Disaster Recovery™ tape drives only) solutions, Intelligent Disaster Recovery reduces the time required to get back online and allows data recovery from the last complete backup set, including full, incremental, and differential backups.

An automated, step-by-step wizard returns the system to the state it was in at the time of the last backup. The administrator can configure Intelligent Disaster Recovery in the manner best suited to needs of the company.

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Backup Exec™ Autoloader Option—This option enables support for the optical autoloader and library system and provides extensive configuration and management capabilities for a wide range of high performance, single or multiple-drive storage systems.

The Backup Exec™ Autoloader Option's advanced capabilities are suited for unattended, or lights-out, enterprise backup and restore operations, including:

- Fault tolerant device pooling
- Scheduled cleaning operations
- Barcode reader support
- Portal support

The Autoloader Option device partition utility partitions autoloader slots to target backup jobs to a specific slot each day. The automated Low Administration Backup feature requires minimal administrator intervention.

Backup Exec™ Shared Storage Option—This option is a powerful, large scale, high-end SAN solution that allows multiple distributed backup servers to share common, centralized backup storage devices that are connected over a Fibre Channel SAN.

The Shared Storage Option:

- Load balances activity across multiple Backup Exec™ servers
- Increases performance
- Increases backup speeds
- Centralizes management tasks
- Lowers the total cost of ownership

Backup Exec™ Agent for Microsoft SQL Server—This agent automatically protects and verifies all SQL 6.x and 7.0 data. This option gives SQL 6.5 users complete protection down to the individual table-space.

SQL 7.0 users can customize data protection needs down to the File Group. This option can also perform transaction log backups with truncation in case the backup window is too small for a Full backup.

Backup Exec™ Agent for Microsoft Exchange Server—This agent is the fastest, most reliable, and most flexible way to protect Exchange server data while the server is online. This option allows complete, individual mailbox backup.

Backup and verification is faster with the exclusive Agent Accelerator technology. Remote backups are maximized by providing source level compression and distributed processing to reduce network traffic.

Backup Exec™ Agent for Oracle Server—This agent provides seamless online backup protection for versions 7.3 and 8.0 of Oracle for Windows NT. Integrating Oracle backup with the advanced features of Backup Exec™ for Windows NT provides complete data protection for Oracle databases, including log files and control files, without taking them off line.

Combined with the Backup Exec™ Autoloader Option, the Backup Exec™ Agent for Oracle Server provides fully automated backups.

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Backup Exec™ Agent for Lotus® Domino™—This agent provides seamless online backup protection for 4.5 or later of Lotus Notes and Domino. Combined with the Backup Exec™ Autoloader Option, the Backup Exec™ Agent for Lotus Domino provides fully automated backups.

Backup Exec™ Agent for R/3 for Oracle Database—This agent provides data protection while the database is still in use. The R/3 Agent, certified by SAP, allows Backup Exec™ to provide both local and remote protection of the latest versions of SAP R/3 databases while enabling efficient data management.

Backup Exec™ Open File Option—This option protects every file on your network while the files are in use. This option handles open files at the volume level and is seamlessly integrated into Backup Exec™. There is no need to know which files are open.

Backup Exec™ NetWare Agent—This agent fully protects all NDS and bindery information across NetWare 3.12, 4.x, and 5.x environments. The Backup Exec™ NetWare Agent is fully SMS compatible and supports current versions of NetWare.

With the exclusive Agent Accelerator™ technology, Backup Exec™ maximizes backup performance by providing source level compression and distributed processing to reduce network traffic.

Compaq StorageWorks Command Console

StorageWorks Command Console (SWCC) is a feature-rich, year 2000 compliant, GUI that provides local and remote management of StorageWorks controllers. The SWCC is a user-friendly tool used to monitor, configure, and troubleshoot storage subsystems and launch management tools for the Fibre Channel tape controllers and storage hubs.

The management interface for the Fibre Channel tape controllers enables the administrator to perform all management and configuration functions that can be performed from the serial or telnet interfaces. The management interface for the storage hubs allows the administrator to monitor port activity, identify and isolate problem nodes, and monitor overall FC-AL use.

The SWCC can be connected to the StorageWorks controller in several ways. Once connected, the SWCC issues commands and interprets the responses sent by the controller. The GUIs display the logical and physical layout, as well as the status of a selected subsystem.

SWCC consists of two major components, the Client and the Agent.

- The Client:
  - Includes the user interface
  - Includes additional services
  - Provides a window into your storage subsystems
- The Agent:
  - Is a host-resident program
  - Is an interface that interprets and transfers data between the Client and the host storage controller

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Compaq User Diagnostics

User Diagnostics provide several management functions for the EBS components:

Detailed device information—This device information allows you to view the library ID, serial number, and firmware revision. Additionally you can see the FCTC world wide name as well as the devices that are attached.

Firmware upgrades—User Diagnostics allows upgrades to both the FCTC firmware and the DLT drive firmware through your Fibre Channel SAN.

Performs functional tests—Functional tests such as DLT buffer read/write, move media, and test unit ready can be remotely administered offline from the server or remote client.

Compaq Insight Manager

Compaq Insight Manager is a comprehensive management tool used to monitor and control the operation of Compaq servers and clients. This control includes the ability to monitor the health and status of the:

- Fibre Channel tape controllers
- Tape libraries
- Individual tape drives
- Firmware level
- World Wide Name
- Serial numbers
- Error counts and whether maintenance is needed

Compaq Insight Manager consists of two components:

- A Windows-based console application
- Server- or client-based management data collection agents.

Working in conjunction with the hardware and firmware, the Compaq Insight Management Agents monitor over 1,000 management parameters. Key subsystems are checked to make health, configuration, and performance data available to the agent software.

The agents act upon the applicable data by initiating alarms in the event of faults, and by providing updated management information, such as network interface or storage subsystem performance statistics. Compaq Insight Manager provides control over systems through monitoring and alerting capabilities for the critical systems in your distributed enterprise.

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Compaq Insight Manager XE

Compaq Insight Manager XE is a web-based enterprise management (WBEM) application which enables browser access to both managed devices and the management application. Compaq Insight Manager XE works with industry-standard management agents and provides easy access at anytime from anywhere.

Compaq Insight Manager XE is able to browse:

- Directly to the systems with the web-enabled Management Agent
- Web-Enabled Compaq Management Agents (4.0 and higher)
- SNMP or DMI management agents
- Compaq Server Management Agents 3.1 or higher
- Compaq Client Management Agents 3.51 or higher
- Third-party devices with SNMP MIB-2 or DMI V2 agents
- Compaq Insight Manager LC (for clients)
- Compaq Intelligent Cluster Administrator
- Non-Compaq web services running on a device

Sizer Utility

The StorageWorks Enterprise Backup Solution Sizing Tool 1.3 is a Windows-based tool used to determine a backup solution based on the information supplied by the user. Before beginning the sizing process, the user must have a thorough understanding of the network, the type of data to be backed up, and the back-up window parameters. The Sizer optimizes the EBS based upon user input.

The StorageWorks Enterprise Backup Solution Sizing Tool 1.3:

- Accepts user input
- Allows the user to select the Options and Agents that are offered by the ISV
- Performs calculations for realistic performance
- Performs the calculations necessary for backup and tape retention
- Configures a solution for a single data zone or a larger solution or domain
- Generates both a report and a proposal for a solution

Download, install, and run the StorageWorks Enterprise Backup Solution Sizing Tool 1.3 to configure a solution for VERITAS Backup Exec™. The Sizer can be found on the Compaq website at:
www.compaq.com

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BackPaq

The EBS BackPaq[2] is designed to make the EBS for Workgroups even more affordable to the growing sets of Windows NT and NetWare customers looking for consistent, consolidated, high speed backup and restore.

The BackPaq kit contains:

- Five VERITAS Backup Exec™ server licenses
- Storage Hub 7
- Fibre Channel Tape Controller

BackPaq offers centralization, automation, performance, scalability, deployment over longer distances, Fibre Channel infrastructure for future enhancements, and investment protection for the same price as direct attach SCSI DLT 35/70 drives. The EBS BackPaq allows for a configuration with up to five servers and up to two DLT drives in an EBS supported library. If necessary, additional licenses may be purchased for investment protection and scalability.

[2] Supported by the Workgroups edition of Backup Exec™.

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Appendix A: References

Compaq

For comprehensive online support, refer to:
www.compaq.com

For international information, refer to:
www.compaq.com/corporate/overview/world_offices.html

Table 1. Departments and Telephone Numbers for Canada and the United States

Department	Telephone Number(s)
Consumer Direct	1-800-888-0220
Compaq DirectPlus	1-800-888-5858 (U.S.)
Compaq Partner Direct	1-800-888-5874
Compaq Reseller Locator	1-800-345-1518 (Option 3)
Compaq Canadian Reseller Locator & Product Literature	1-800-587-1616
Diskette Fulfillment (backup diskettes for preinstalled software)	1-800-952-7689 (U.S.) 1-800-349-8498 (Canada)
Compaq Product Information	1-800-345-1518 (U.S.) 1-800-587-1616 (Canada)
Compaq Technical Support	1-800-OK-COMPAQ (U.S. and Canada) 1-800-652-8672

VERITAS

For comprehensive online support, refer to:
support.veritas.com/

For more detailed information on VERITAS Backup Exec™, refer to:
www.veritas.com/

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